Title: Responding To A Downed Unmanned Aircraft System (UAS) Platform

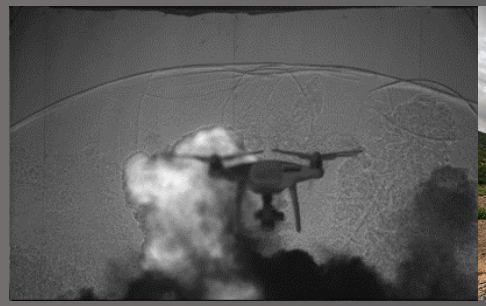
Author(s): Collins, Adam Donald
Halladay, Brian
Atencio, Julian James

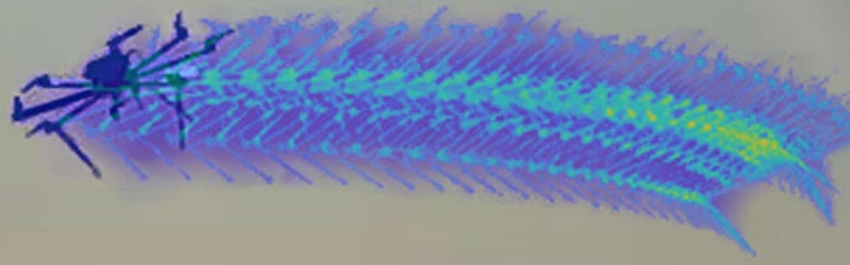
Intended for: Engagement Material for future International Nuclear Security activities

Issued: 2021-09-16

INS
International Nuclear Security
*Reducing Risk of Nuclear Terrorism*

# RESPONDING TO A DOWNED UNMANNED AIRCRAFT SYSTEM (UAS) PLATFORM






Sandia National Laboratories

Los Alamos NATIONAL LABORATORY EST. 1943

OAK RIDGE National Laboratory

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

# Overview

- Downed Platform Defined
  - Intentional Downing
  - Forced Landing via spoof
  - Isolated Discovery
- Response Coordination
- Response Steps:
  - Identification
  - Notifications
  - Ground Response
  - Turnover to Authorities
- Roles of Law Enforcement (LE)
- Summary

A drone may be forced down as part of a kinetic Counter-UAS action or as a spoof signal with a command to land immediately.

A drone could also be incidentally discovered by an employee or by a random patrol.

In each case, the platform should be considered a suspicious package until it can be determined to be non-hazardous by qualified personnel.

# Downed UAS Platform: Defined

**Downed Platform:** A UAS landed or crashed on land, water, buildings or structures

Can be encountered:

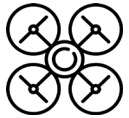
Any *where*

https://www.flaticon.com/authors/pixel-perfect

Any *time*

https://www.flaticon.com/authors/monkik

Any *type*



https://www.flaticon.com/authors/freepik


Size and sophistication can vary greatly

**A planned, coordinated, and timely response is critical.**

# Coordinated Effort At A Nuclear Facility

**An Example Response:**

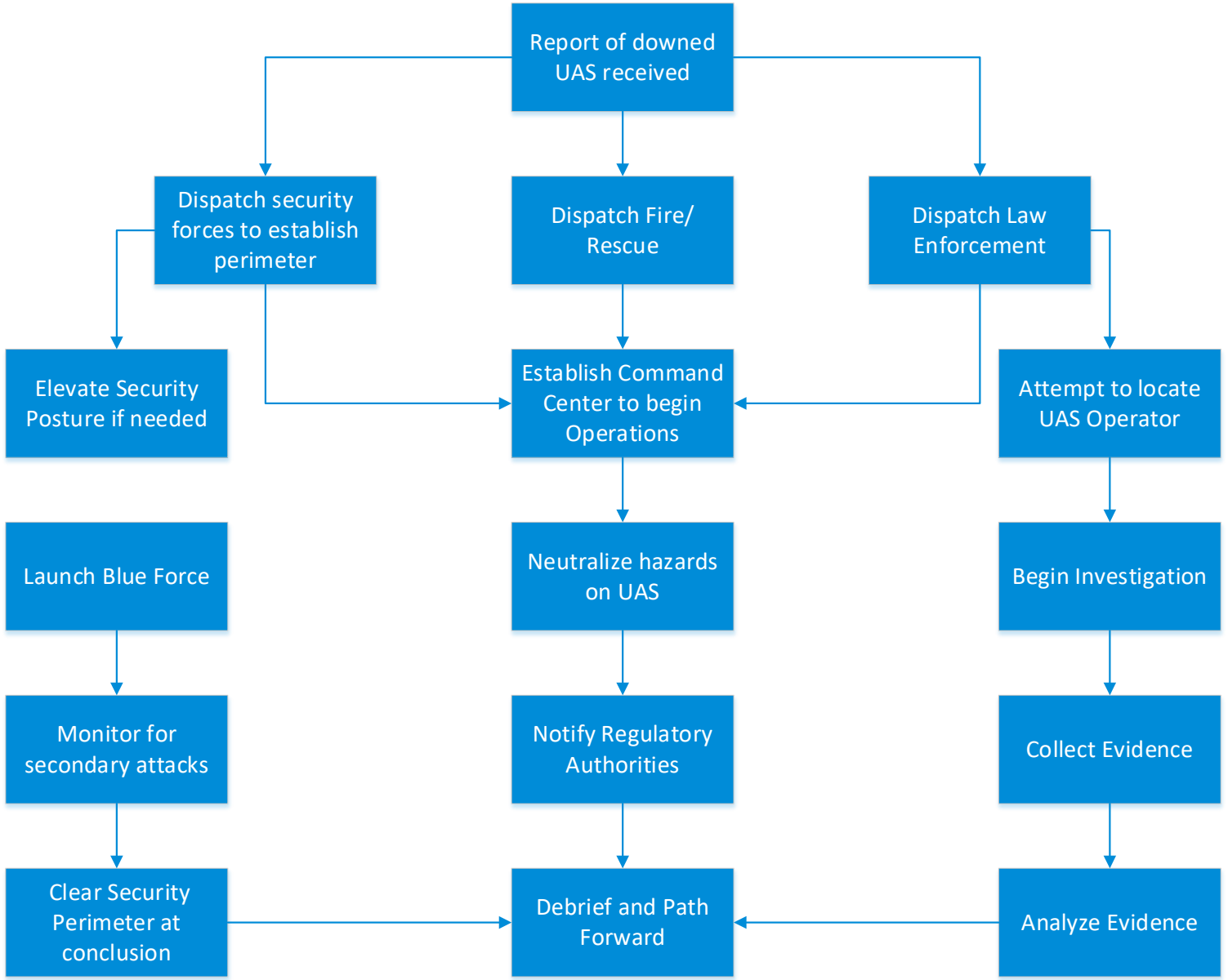
- Detect, identify, monitor, and track the UAS with a Counter-UAS (CUAS) System
- Issue notifications
- Disrupt control of the UAS
- Platform is downed
- Seize or confiscate the UAS
- Use reasonable force to disable or destroy the UAS
- Forensics and turnover to authorities

# Nuclear Facility Coordination

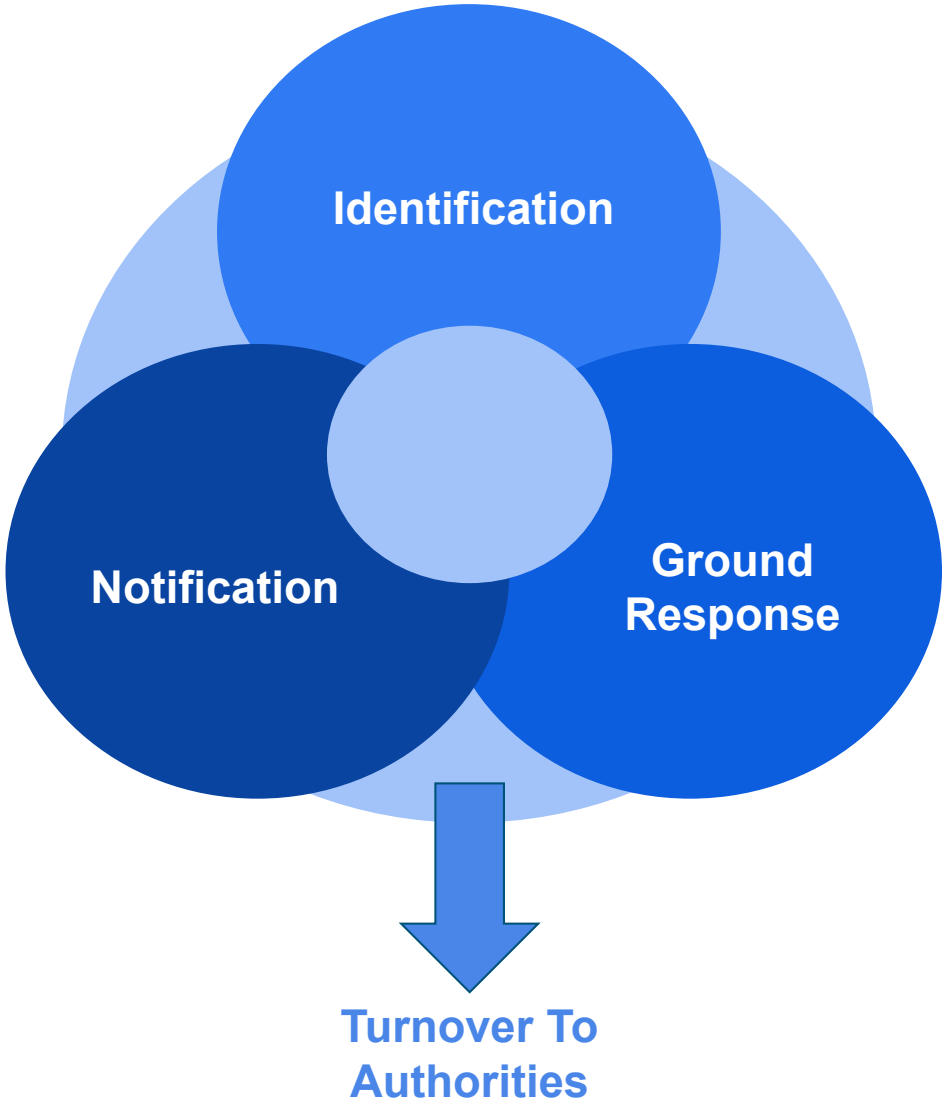
**After agreements are established……**

- **Sites should develop a decision matrix to guide their responses to downed platforms (and detection of unauthorized UASs if facility has CUAS).**

- **The matrix should be based on the CONOPS and the capabilities of the site (whether or not CUAS is employed).**


Report of downed UAS received
Dispatch security forces to establish perimeter
Dispatch Fire/ Rescue
Dispatch Law Enforcement
Elevate Security Posture if needed
Establish Command Center to begin Operations
Attempt to locate UAS Operator
Launch Blue Force
Neutralize hazards on UAS
Begin Investigation
Monitor for secondary attacks
Notify Regulatory Authorities
Collect Evidence
Clear Security Perimeter at conclusion
Debrief and Path Forward
Analyze Evidence

# Response: What are the steps?



# Preserving Evidence and Maintaining Chain of Custody

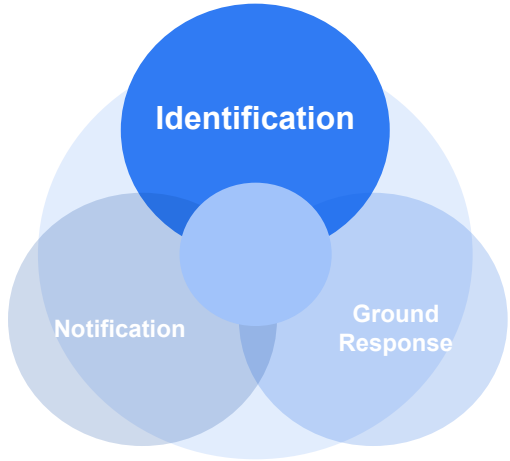
- Once you determine a crime may have been committed utilizing UAS, it is imperative to preserve any evidence to include the UAV, data cards and your system data if CUAS was used to neutralize the threat.
- Law Enforcement will move to collect evidence using their procedures. A warrant may need to be obtained in order to collect evidence at the site.
- Handling the UAV as part of the suspicious package mitigation is acceptable.
- Once the hazard has been mitigated and criminal activity is suspected, the scene should be preserved for Law Enforcement.
- Tainted evidence becomes less useful and may result in suppression of valuable content for the prosecutor.
- Understanding and developing the nexus to threat and the link to criminal activity is critical in preserving evidence.

# Response: IDENTIFICATION

1. **Type**
   a. Rotor / fixed-wing / jet
   b. Consumer / professional
   c. Payload visible?
   d. Size
   e. Markings

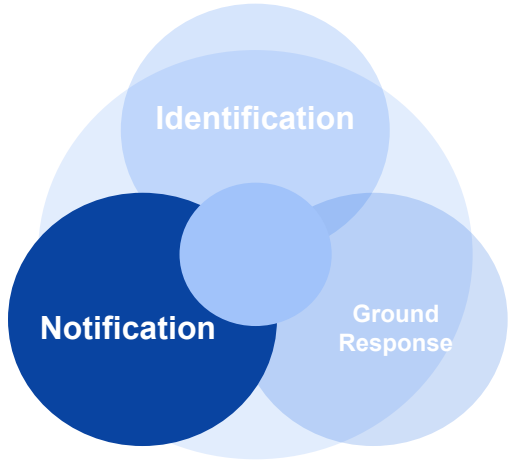

2. **Operational Status**
   a. Motors spinning?
   b. Powered / off?
   c. Smoke? Fire?
   d. Lights or sounds?


3. **Nearby Assets**
   a. Personnel
   b. Structures
   c. Materials

# Response: NOTIFICATION

1. **Internal Institutional Notification**
   a. Centralized Incident Management
      i. Issues notification to internal and external agencies
      ii. May coordinate institutional response
      iii. May act as information passthrough from external to internal
   b. Notification to Institutional:
      i. Security
      ii. Management
      iii. Residents / workforce (evacuate, shelter)



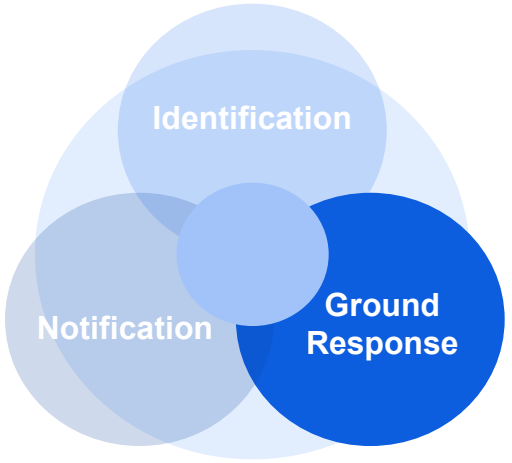

2. **Local External Notification:**
   a. Law Enforcement
   b. Fire Department
   c. Bomb / Threat Response

3. **Federal External Notification**
   a. Law Enforcement
   b. Aviation Authority

# Response: GROUND RESPONSE

1. **Jurisdiction, Could Be Any Of:**
   a. Institutional
      i. Emergency Management
      ii. Security Department
   b. Local
      i. Law Enforcement (example: city or state police)
      ii. Fire Department
      iii. Bomb Squad
   c. Federal
      i. Law Enforcement (example FBI)
      ii. Aviation Authority (example FAA)

2. **Act Upon UAS**
   a. Establish safe perimeter
   b. Disable UAS (example: net)
   c. Retrieve or dispose (explode) UAS




# Response: TURNOVER TO AUTHORITIES

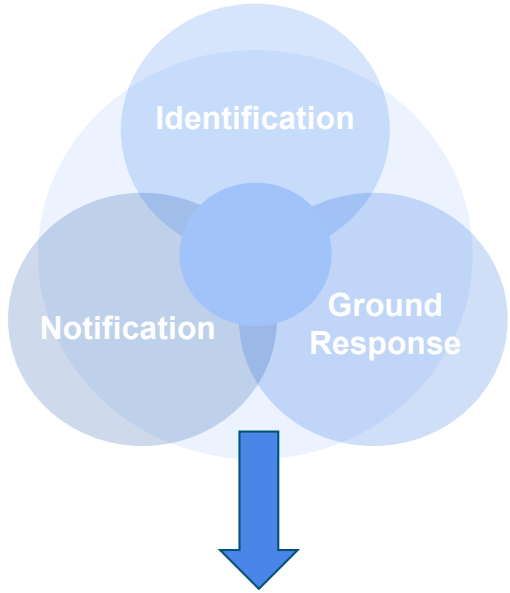
**At some point, the response process may be turned over to local or federal criminal, aviation, or other authorities.**

**Turnover can happen:**

- At any stage of the response
- Whether or not the UAS incident is criminal

**Authorities may wish to document, investigate, and/or prosecute.**
**Success may be aided with:**

- Eyewitness testimony
- Response documentation
- Photos / videos
- UAS equipment or remains
- Access to incident location



# Roles of Law Enforcement

**State and local Law Enforcement Agencies are often in the best position to investigate and pursue enforcement actions to stop unauthorized UAS operations.**

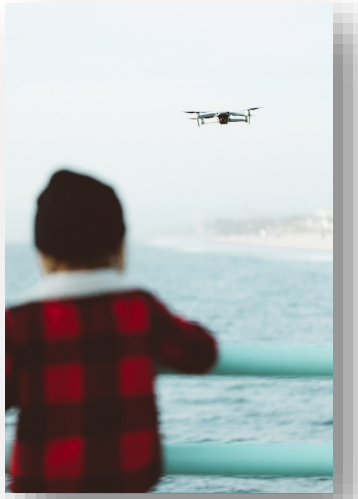
- Witness Identification and Interviews
- Identification of Operators
- Evidence Collection
- Viewing and Recording the Location of the Event
- Identifying Sensitive Locations
- Aviation Authority Notification


**Virtually all of the items listed above are *already in the tool box* for law enforcement officers.**

# Roles of Law Enforcement

## Witness Identification and Interviews

- The identification of witnesses and the conduct of initial interviews in a timely manner are critical to supporting potential enforcement actions.



## Identification of Operators

- Few UAS technologies have identifying markings, so it is important to locate and positively identify the UAS operator and anyone else that may be supporting the flight.

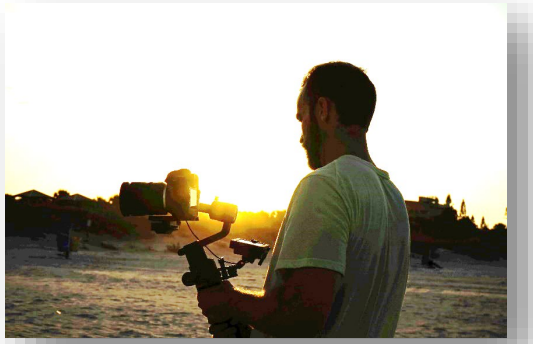
## Evidence Collection

- Local law enforcement is in the best position to inquire and make initial requests to identify and preserve evidence or obtain legal process for securing evidence in the context of an investigation.

# Roles of Law Enforcement

## Viewing and Recording Location of the Event

- The taking photos or videos of the scene in close proximity to the event help to distinguish the daylight, and prevailing weather conditions during the flight.



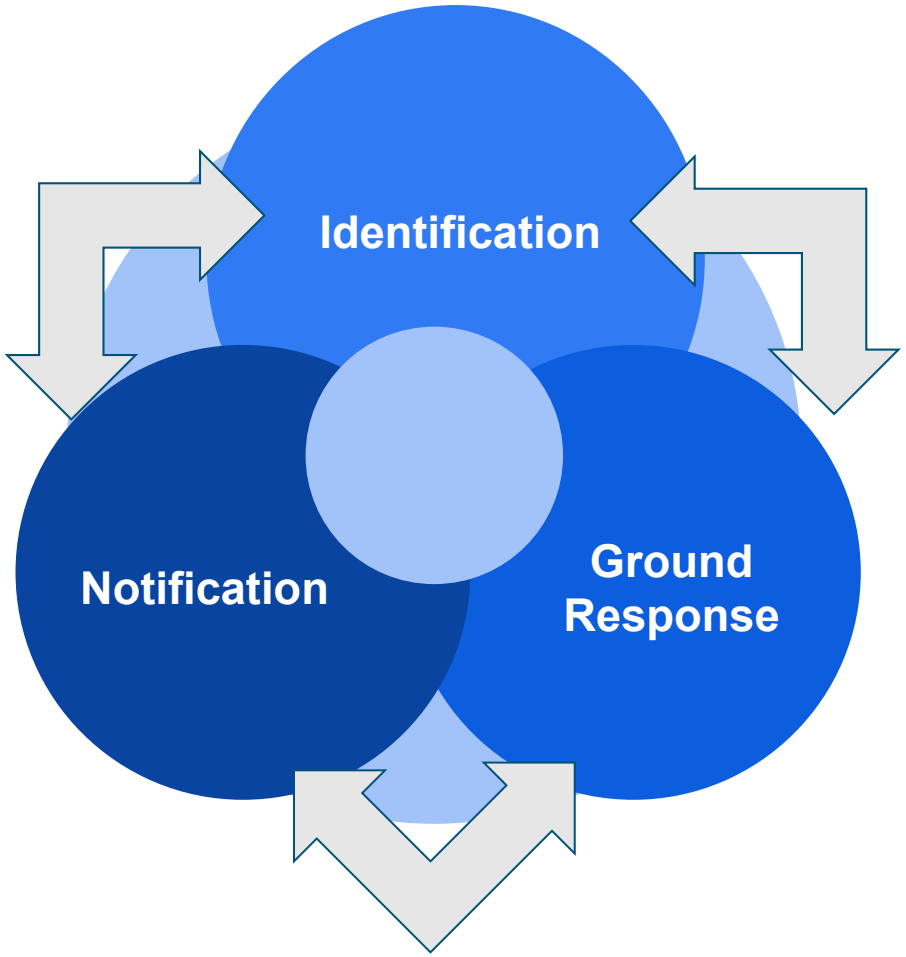
## Identifying Sensitive Locations

- Law enforcement should be able to identify locations that might have national security concerns or security-driven airspace restrictions


## Aviation Authority Notification

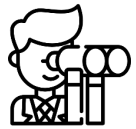
- Immediate notification of the incident to the regional aviation authority who may take additional enforcement action.

# Response Steps Can Feed Back to Each Other



# Example Workflow for UAS Intrusion Response

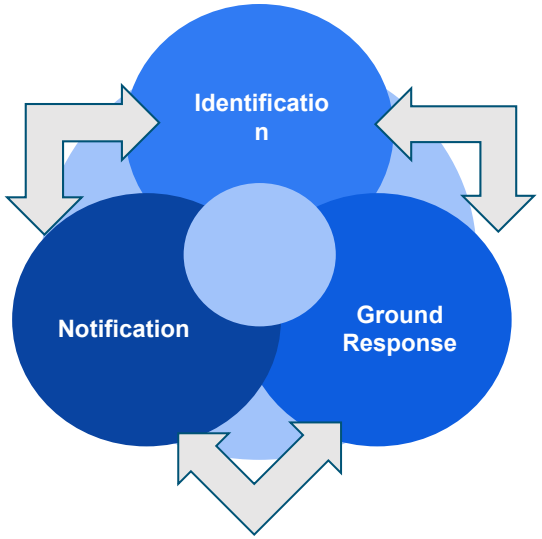
## ***Identification*** of Unauthorized UAS Intrusion



- Initiate safety procedures, ***notifications***
- If a threat to protected area:
  - Neutralize (command and control Jamming, RF or WiFi, Kinetic energy)
  - Deadly Force may be authorized (Federal nuclear facilities, etc.)

## ***Ground Response*** to UAS down in protected area

- Safety procedures and emergency care
- Secure the scene: security cordon set in place, restrict access
- No attempt to approach or disable the landed UAS
- ***Notify*** emergency department, bomb squad, fire department, LE
- Treat as suspicious package until rendered safe
- Specialist will render safe (emergency department, bomb squad, LE)
- ***Turnover*** / assist with LE Forensics



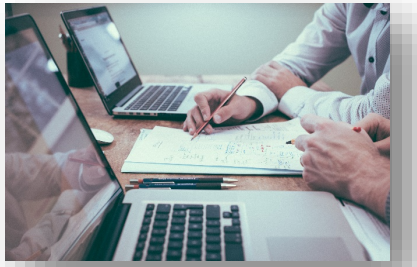

## After Action ***Notifications***

- Federal Bureau of Investigation, Federal Aviation Administration, etc.
- ***Turnover to authorities***

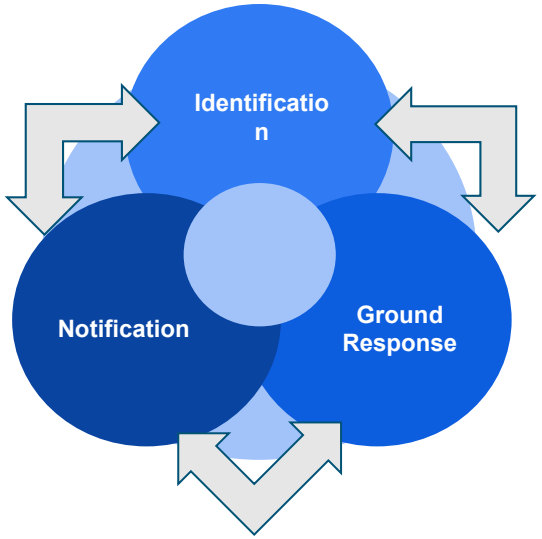
Icons: https://www.flaticon.com/authors/freepik

# Summary

- **Planning is critical**
  - Decision Matrix

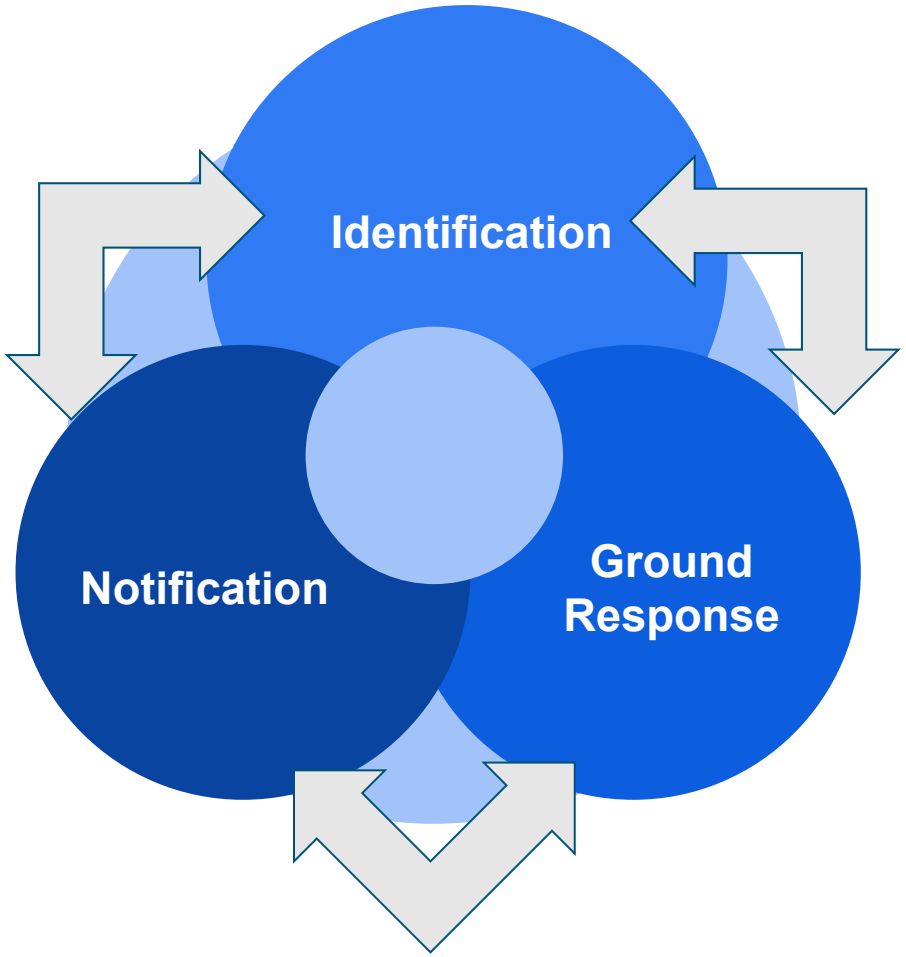


- **Coordination is necessary**
  - Roles for facility, LE, other partners




- **Response Steps:**
  - Identification
  - Notifications
  - Ground Response
  - Turnover to Authorities

# Thank you



# Suggested Questions for Various Agencies

**Police and Fire Department**

1. What criteria needs to be met for them to contact a federal agency (e.g., FBI) and ask for assistance? Other agencies?
2. If a package is suspected of carrying explosives, do they explode on site or carry away?
3. Before a package is destroyed, what evidence is collected?
4. Will they chase an operator into another jurisdiction?
5. What constitutes probable cause for detention or investigation of a suspected operator?
6. How does the response differ by location of drone, i.e. parking lot vs. roof vs. roadway vs. vegetated landscape?

**Facility Security**

1. Standard perimeter distance for a suspicious package? What factors change perimeter?
2. Is a downed UAS always considered a suspicious package? If not, when (if operator or witness gives potentially credible information)?
3. Are radio transmissions prohibited in a certain perimeter? What types of transmission?
4. If drone is upright, is it covered?
5. What steps are taken to render drone not airworthy?
6. Does Radiation Protection respond (Japan Prime Minister)